

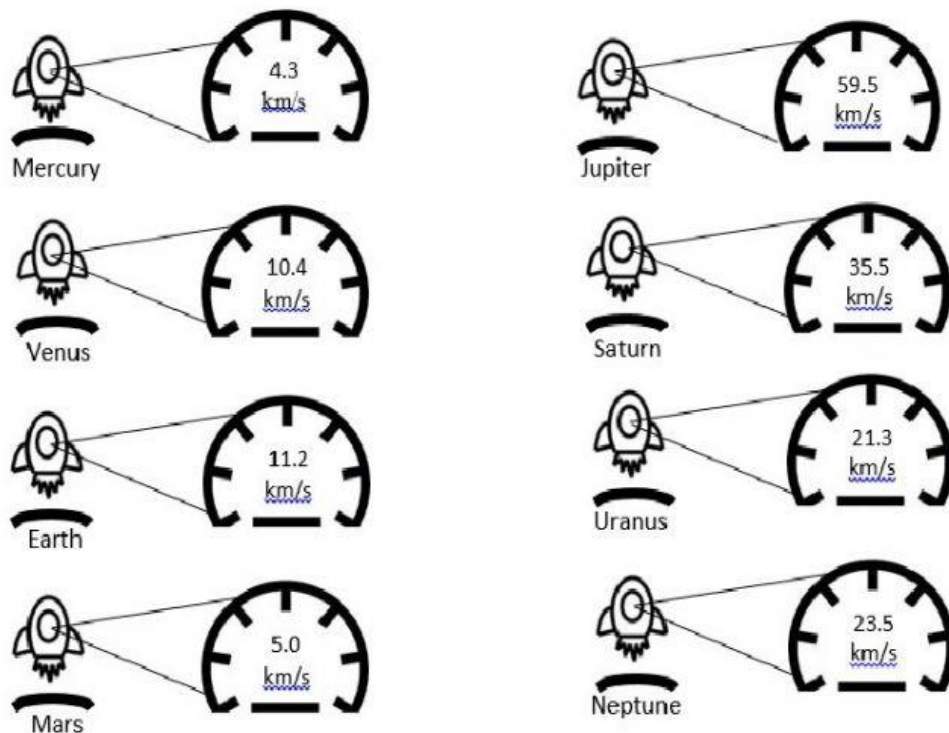


Assessment

DIRECTIONS: Read each question carefully. Choose the letter of the best answer. Write your answer on a separate sheet of paper.

1. Which is viewed as a distortion of space-time?
 - a. mass
 - b. time
 - c. gravity
 - d. force
2. What happens to light as it travels along a massive cosmic body?
 - a. it bends
 - b. it reflects
 - c. it bounces
 - d. it disappears
3. What cosmic body can distort space-time the most?
 - a. Sun
 - b. Moon
 - c. Earth
 - d. Jupiter
4. What force is explained by general relativity?
 - a. Weak nuclear force
 - b. Strong nuclear force
 - c. Electromagnetic force
 - d. Gravitational force
5. What is the minimum velocity needed for a spacecraft to leave the Earth?
 - a. less than Earth's escape velocity
 - b. greater than Earth's escape velocity
 - c. equivalent to Earth's escape velocity
 - d. equivalent to the speed of light
6. Which of the following is an accelerating frame of reference?
 - a. a moving car at constant speed
 - b. a building
 - c. free-falling object
 - d. a stationary bus
7. How does special relativity differs from general relativity?
 - a. Special relativity applies only to moving frames while general relativity applies only to stationary frames.
 - b. Special relativity applies only to stationary frames while general relativity applies only to accelerating frames.
 - c. Special relativity applies only to stationary or moving frames while general relativity applies only to accelerating frames.
 - d. Special relativity applies only to accelerating frames while general relativity applies only to stationary or moving frames.

8. What is space-time?
- Space-time is a combination of three-dimensional space with time.
 - Space-time is a time an object takes to travel in space.
 - Space-time is a gravitational field.
 - Space-time is a two-dimensional space and time.
9. What can best explain the unusual orbit of Mercury?
- Perturbation
 - Sun's warping of space-time
 - gravity
 - both a and b
10. Why do GPS clocks need to be corrected using the General Theory of Relativity?
- because they are far away from Earth
 - because they are stationary
 - because they are orbiting the Earth
 - because they are affected by the Earth's warping of space-time
11. What planet in the solar system is most affected by the sun's warping of space-time?
- Mercury
 - Venus
 - Earth
 - Mars
12. The speedometer readings in every spacecraft show the escape velocities of each planet. Based on the following illustrations, determine which of the statements below is true.



<https://nssdc.gsfc.nasa.gov/planetary/factsheet/>
Photo Credits: Vea Marie V. Jhardjola 2020

- A spacecraft must attain a speed of 11.2 km/s to leave the Earth's surface.
- It is easier to leave the surface of Jupiter than Earth.
- Escape velocity is not affected by the planet's mass.
- Mars has a smaller escape velocity than Venus and Earth because it is farther from the sun.

13. What must be the velocity of an object to escape a black hole?
- a. less than the speed of light (c)
 - b. zero
 - c. equal to c
 - d. greater than c
14. How does mass affect the warping of space-time?
- a. The greater the mass of an object, the space-time around it becomes more distorted.
 - b. The greater the mass of an object, the space-time around it becomes less distorted.
 - c. The lesser the mass of an object, the space-time around it becomes more distorted.
 - d. The mass of an object does not affect the warping of space-time.

For nos. 15 and 16, refer to the table below:

Planet	Mass ($\times 10^{24}$ kg)	Diameter (km)
Venus	4.87	12,104
Earth	5.97	12,756
Jupiter	1898	142,984
Uranus	86.8	51,118

15. Based on the data, what planet can warp space-time the most?
- a. Venus
 - b. Earth
 - c. Jupiter
 - d. Uranus
16. Based on the data, what planet can warp space-time the least?
- a. Venus
 - b. Earth
 - c. Jupiter
 - d. Uranus
17. What is an example of a non-inertial frame of reference?
- a. a stationary frame
 - b. moving frame
 - c. Earth
 - d. a rotating frame
18. How does the curvature of space-time affect the light from distant stars?
- a. The curvature of space-time reflects light passing through it.
 - b. The curvature of space-time bends light passing through it.
 - c. The curvature of space-time does not allow light pass through it.
 - d. The curvature of space-time absorbs the light passing through it.
19. Which is true about time according to general relativity?
- a. Time slows down with gravity.
 - b. Time accelerates with gravity.
 - c. Time is pulled down by gravity.
 - d. Time can't be changed by gravity.
20. How does General Relativity view gravity?
- a. Gravity warps space and time.
 - b. Gravity is the curvature of space-time.
 - c. Gravity warps mass.
 - d. Gravity is a force.